Testimony of Mark V. Rosenker, Acting Chairman
National Transportation Safety Board
before the
U.S. House of Representatives
Committee on Transportation and Infrastructure
Subcommittee on Railroads
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Good morning, Chairman LaTourette and Members of the Subcommittee. Thank you for the opportunity to testify before you today on behalf of the National Transportation Safety Board (NTSB) on railroad grade crossing safety issues.

Grade crossing accidents are tragic events and we appreciate the serious attention that this Subcommittee is devoting to this important safety issue. I appreciate the opportunity to discuss the Safety Board's findings on train whistle audibility and passive grade crossing safety, and to briefly update you on the positive train control safety issue.

Train Whistle Audibility

The NTSB has long been interested in the adequacy of a train's audible warning system to alert motorists to the train's presence at grade crossings. We have examined this issue in a variety of accidents and note that while train horns can be effective, they can also fail to communicate the intended warning.

The sound of a train horn is effective as a warning only if the driver recognizes it as a train horn and takes appropriate action. This recognition is affected by the noise levels inside the vehicle (defrosters, air conditioners, wipers, radios, etc.). It can also be affected by soundproofing designed to cut down on engine, transmission, road and exterior traffic noise. The impaired hearing of the vehicle operator can also worsen the issue.

We first voiced our concern 37 years ago in a 1968 accident report involving nine fatalities in a station wagon at a grade crossing in Sacramento, California. The Safety Board concluded that the audible warning system was "spotty and defective" and recommended that the Federal Highway Administration study whether train horns and other external audible warning devices could be heard inside motor vehicles.

In 1986,the Safety Board conducted a study of passenger/commuter train and motor vehicle collisions at grade crossings and found that in 27 of the 75 incidents investigated, the occupants of the automobiles, pickup trucks, heavy trucks and other vehicles could not hear the audible warning system of the train, indicating that this audible warning system was inadequate as a primary warning system. In that study, the Safety Board concluded that train horns should be improved to better address the audibility concern.

The NTSB has been particularly concerned with the potential for grade crossing accidents involving school buses and the sound dampening characteristics of such vehicles. We have investigated two school bus accidents of special note—one in Fox River Grove, Illinois (October 25, 1995), and another in Conasauga, Tennessee (March 28, 2000). Audibility tests conducted in conjunction with these two accidents helped frame the nature of the problem. Research has shown that detecting a sound will not lead to appropriate action unless the sound is identified or has reached the alerting level. If a sound is to be identified, the warning signal must be 3 to 8 decibels (dB) above the threshold of detection; if a sound is to reach the alerting level, the warning signal must be approximately 10 decibels above the ambient noise.

In the Fox River Grove accident, our tests indicated that the train was only about 100 feet or 1.1 seconds from impact when the train horn sound exceeded the ambient noise levels at the driver's seat by 3 to 5 dB. In the Conasauga accident, the Safety Board concluded that the driver had difficulty detecting the train horn at all, and was probably unaware of the presence of the train. In both accidents, the train horns functioned properly and were sounded well in advance of the crossings and up to the crossings. In each case, the doors and windows of the buses were closed, radios were playing and the bus ceilings were at least partly covered with sound attenuating panels. The panels are capable of reducing sound as much as 25 dB in a bus when compared to a bus without attenuating panels.

For school buses at least, the states generally mandate concerted driver efforts to hear the horns of oncoming trains by requiring doors and windows to be opened and radios turned off. When such efforts are made, train horns can be heard. Since automobile drivers are unlikely to make such efforts, the effectiveness of a train horn as a warning device for them is problematic.

To address this point, the Safety Board conducted a study in July 1998 on safety at passive grade crossings. As a part of this study, the Safety Board tested the audibility of a train's horn within 13 passenger and emergency vehicles representing the current generation of highway vehicles. The vehicles included truck tractors, a school bus, a motor coach, a fire engine, an ambulance, pickup trucks and passenger cars. The tests used a three-chime horn mounted on a locomotive that was 100 feet from the test vehicles. At this distance, the sound of the horn, when measured outside the test vehicles, was 96 dB.

The Safety Board also tested the audibility of the train horn within vehicles when the windows were closed and the engines were idling. The sound of the train horn ranged from 25 dB above to 2 dB below the ambient sound level. In 5 of the 13 vehicles tested, the sound of the horn was not 10 dB above the level of the ambient noise, thus not loud enough to alert the drivers.

Further, when the fans were running on these vehicles with the windows closed and the engines idling, the horn's sound ranged from 8 dB above to 11 dB below the level of ambient sound. The horn was not audible at all in seven of the test vehicles; and in all the other vehicles, the sound of the horn was less than 10 dB above the level of the ambient sound. Nevertheless, the train horn is an important part of grade crossing safety; it should be sounded unless other actions are taken that act as an effective substitute at crossings.

In a effort to find such effective substitutes, the Safety Board issued a recommendation in its 1998 study to the U.S. Department of Transportation (DOT) to "develop and implement a field test program for in-vehicle safety and advisory warning systems, variable message signs, and other active devices; then ensure that the private entities who are developing advanced technology applications modify those applications as appropriate for use at passive grade crossings. Following the modifications, take action to implement use of the advanced technology applications" (Safety Recommendation I-98-1).

In the Safety Board's opinion, the technologies described in the recommendation, particularly in-vehicle warning systems, can help enhance safety at passive grade crossings. Such in-vehicle warning systems are a potential solution to the audibility problem that drivers encounter.

An in-vehicle warning system receives information about an approaching train either from the train itself or through the infrastructure and provides an auditory and visual warning inside the vehicle to the driver. The U.S. DOT has sponsored testing of several intelligent transportation systems (ITS) projects to improve safety at grade crossing. This testing has included projects in six states (Minnesota, New York, Illinois, Maryland, California and Texas) involving in-vehicle safety and/or advisory warning systems. Work is ongoing and our safety recommendation (I-98-1) is classified "Open--Acceptable Response." The potential for ITS improvements in grade crossing safety is promising. We have seen the carnage associated with accidents, especially school bus accidents. Had the Fox River Grove and Conasauga school buses been equipped with in-vehicle warning systems, both accidents may have been prevented and the lives of 10 children saved.

Passive Grade Crossings

The Safety Board's 1998 safety study on passive grade crossings made a number of recommendations to improve safety on the almost 97,000 passive grade crossings in the United States. When the study was made, there were approximately 4,000 accidents at grade crossings, of which more than half occurred at passive grade crossings even though there was generally less highway traffic at these passive crossings. Those numbers have improved somewhat since the study was done, but the accidents and fatalities still occur at unacceptable levels.

The cost to eliminate or upgrade passive grade crossings is very high. According to the General Accountability Office, the average cost of adding lights and gates in 1995 was $150,000 per grade crossing, making the total cost to upgrade the almost 97,000 passive crossings on public roadways more than $14 billion. However, even expensive gates and lights do not completely eliminate the hazards at crossings. The ultimate solution from a safety standpoint would be the construction of bridges or underpasses that eliminate grade crossings which can cost $3 million per crossing (in 1995 dollars).

Therefore, because of the large number of passive grade crossings, the high percentage of fatalities that occur at passive grade crossings and the cost to eliminate or upgrade passive grade crossings, the Safety Board investigated 60 grade crossing accidents to identify some of the common causes for accidents at passive grade crossings and to identify less costly remedies to improve safety at passive crossings.

In conjunction with this study, the Safety Board convened a 2-day public forum in Jacksonville, Florida, in May 1997 to gather information about issues affecting safety at passive grade crossings. Witnesses included experts from the railroad industry; law enforcement; research groups; Operation Lifesaver; and Federal, State and local government agencies. In addition, representatives from Canada and Italy discussed passive grade crossing issues and experiences in their countries.

Based on the results of the Safety Board's accident investigations and the information gathered at the public forum, the Board identified and made recommendations on the adequacy of existing warning systems to alert the driver to the presence of a passive crossing and an oncoming train; roadway and track conditions that affect a driver's ability to detect the presence of an oncoming train; behavioral factors that affect a driver's ability to detect the presence of an oncoming train; the adequacy of existing driver education material regarding the dangers of passive grade crossings and driver actions required; the need for a systematic and uniform approach to passive grade crossing safety; and the need for improved signage at private passive crossings.

Specifically the Board recommended that the U.S. DOT fund and the States install STOP and STOP AHEAD signs at passive grade crossings. This recommendation was issued as an intermediate measure, recognizing the cost of safer solutions that included grade separation and/or the installation of active grade crossing warning devices. The Board also recognized that in some cases an engineering analysis might be necessary to determine if a stop sign would reduce the level of safety.

By placing a stop sign at a passive crossing, a clear, unambiguous message is sent to the driver so that the driver knows both where the crossing is and what action must be taken. The actions required by the stop sign are well understood by drivers and drivers stopped at a crossing have more time in which to detect an approaching train.

Additional studies support the Board's conclusion that the traditional CROSSBUCK sign at passive grade crossings is inadequate. For example, a 1993 study conducted at Federal Highway Administration's Turner-Fairbanks Highway Research Center (FHWA-RD-93-153) revealed that the CROSSBUCK sign's familiar "X" shape was one of the most widely recognized traffic control sign shapes in the United States. However, to the vast majority of road users it means the presence of a highway-rail crossing but it does not mean that they should yield the right of way to an approaching train. In other words, the CROSSBUCK sign fails to convey a clear, concise, behavior-directing message to the road user. The legend "RAILROAD CROSSING" explains what it is and where it is, but fails to adequately convey to the road user what they are supposed to do with that message.

A report by a U.S. DOT Technical Working Group issued in 2002, *Guidance on Traffic Control Devices at Highway-Rail Grade Crossings*, further underscored the need "…to convey a clear, concise, and easily understood message to the driver...[to] facilitate education and enforcement" at passive highway-rail crossings.

In response to the Board's safety recommendation, two organizations have come up with a compromise solution, which combines the CROSSBUCK sign with either a STOP or a YIELD sign.

The National Cooperative Highway Research Program issued Report number 470, *Traffic-Control Devices for Passive Railroad-Highway Grade Crossings,* in 2002 that recommends either a STOP or YIELD sign be displayed in conjunction with the CROSSBUCK sign, preferably on the same signpost, at all passive public highway-rail grade crossings. The National Cooperative Highway Research Program is administered by the Transportation Research Board and conducts research in acute problem areas that affect highway planning, design, construction, operation, and maintenance nationwide.

More importantly, this compromise has been adopted by the National Committee on Uniform Traffic Control Devices (National Committee). This group maintains the Manual on Uniform Traffic Control Devices (MUTCD) published by FHWA. The MUTCD is the publication used by all traffic control professionals that specifies the use of all traffic control devices in the U.S. The National Committee has recommended that the MUTCD be revised to require the use of the combination of the CROSSBUCK and a YIELD or a STOP sign at all passive grade crossings. If adopted by FHWA, this guidance will be incorporated into the next publication of the MUTCD in 2008. A draft of this guidance is being circulated and FHWA is considering issuing interim guidance on this issue to the States in order to implement this change before the 2008 publication date.

The STOP sign with the CROSSBUCK sign would be used where a traffic engineering study showed a need for all vehicles to stop due to sight distance restrictions or other characteristics of the crossing and the roadway approach to the crossing.

This is a positive step and I look forward to seeing the final guidance put forth by FHWA.

Positive Train Control

Finally, I wish to thank the Chairman and the Subcommittee for its interest in positive train control and for holding a hearing on this important safety issue earlier this year (April 28, 2005). The development and implementation of positive train control systems for main line tracks, especially where commuter and intercity passenger railroads operate, continues to be on the Safety Board's list of Most Wanted Transportation Safety Improvements (Safety Recommendation R-01-6).

Last week (July 10, 2005), the Safety Board launched a team to investigate the cause of a head-on collision between two Canadian National Railway Company freight trains in Anding, Mississippi that killed four crewmembers. Although this accident is still under investigation, the lack of a positive train control system is a safety issue that we will again examine.

In fact, the Safety Board is just finishing the investigation of an Amtrak accident that occurred on this same route on April 6, 2004, about 15 miles away. Although the Amtrak accident involves track related safety issues, the risk of collisions between passenger trains and freight trains on shared routes continues to be of high concern to the Safety Board. The NTSB will deliberate on the Amtrak accident investigation draft report next week—July 26.

Thank you again for the opportunity to testify, and I am available to answer any questions.